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POTTING MEDIA FOR HONDURAS PINE

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Summary

An earlier Research Note[1/] reported that during 1961 studies showed Honduras pine seedlings growing in sphagnum moss grew almost twice as fast in height as seedlings in soil and 23% more than seedlings growing in a mixture of vermiculite and sandy loam.

The following materials were similarly compared during 1962: (1) sphagnum moss (2) ground vermiculite (3) coco-peat (4) year-old mahogany sawdust (5) a mixture of one part coco-peat and three parts sawdust (6) a mixture of equal parts of coco-peat and sawdust. During 1963 comparisons were made between (1) a mixture of equal parts of vermiculite and mahogany sawdust (2) peat, and (3) sphagnum moss.

Results of the 1962 study showed no statistical difference in the heights of the seedlings obtained. The order from the highest to the lowest were as follows: (1) sphagnum moss, (2) vermiculite, (3) coco-peat, (4) mixture of 3/4 sawdust and 1 part coco-peat, (5) equal parts of sawdust and coco-peat, (6) pure sawdust. Diameter growth of the seedlings in sphagnum moss was greater than other materials, except vermiculite. There was no statistical difference in diameter growth between trees in vermiculite and in coco-peat.

The 1963 study likewise showed no statistical difference

* In cooperation with the University of Puerto Rico.

1/ Marrero, J. 1961. Sphagnum moss as a medium for rooting pine seedlings. Tropical Forest Note No. 9. Institute of Tropical Forestry, Rio Piedras, Puerto Rico.

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in height growth between seedlings grown in the different media; diameter growth of seedlings growing in sphagnum moss exceeded that of those in coco-peat. Plants growing in the mixture of vermiculite and mahogany sawdust were not statistically different from those in sphagnum moss or coco-peat.

Resumen

Una publicación[2/] anterior informó el resultado de un estudio llevado a cabo durante el año 1961 en los siguientes términos: arbolitos de pino hondureño en bolsas de tela plástica de polietileno que contenían musgo esfagno crecieron casi dos veces más rápidamente que cuando las bolsas contenían tierra. El crecimiento fué 23 por ciento más rápido que cuando las bolsas contenían una mezcla de terreno arenoso lómico y de vermiculita.

Debido a que el musgo esfagno es escaso localmente y tiene gran demanda se continuó la búsqueda de otros materiales que fueran superiores a la tierra o a las mezclas de tierra y de más fácil obtención que el musgo esfagno para crecer los arbolitos de pinos en bolsas de tela plástica.

Año 1962

Durante el año 1962 se compararon los siguientes materiales: (1) musgo esfagno, (2) vermiculita triturada, (3) cubierta o estopa del coco molida (coco-peat), (4) aserrín de madera de caoba de un año de curado, (5) mezcla de una parte de "coco-peat" y tres partes de aserrín de madera, (6) mezcla de partes iguales de "coco-peat" y aserrín de madera.

Los datos de crecimiento analizados al final de siete meses demostraron que las diferencias obtenidas en la altura de los arbolitos al final de este período no fueron estadísticamente significativas. El orden de magnitud del crecimiento fué como sigue: 1°. musgo esfagno, 2°. vermiculita, 3°. "coco-peat", 4°. mezcla de 3/4 de aserrín y 1/4 de "coco-peat", 5°. partes iguales de aserrín y "coco-peat" y último, aserrín puro. El crecimiento en este último material fué calificado como pobre.

2/ Marrero, J. 1961. El musgo esfagno en la propagación de arbolitos de pino. Apuntes Forestales Tropicales Núm. 9. Instituto de Dasonomía Tropical, Rio Piedras, Puerto Rico.

El crecimiento de diámetro en la base del tronco de los arbolitos en el musgo esfagno demostró ser estadísticamente superior al mismo en todos los otros materiales excepto a la vermiculita. No hubo una diferencia significativa entre la vermiculita y el musgo esfagno ni entre la vermiculita y el "coco-peat". El orden de magnitud del crecimiento en diámetro fué igual al del crecimiento en altura con la sola diferencia que la mezcla de partes iguales de coco-peat y aserrín ocupó el cuarto lugar en vez del quinto lugar y la otra mezcla de los mismos materiales ocupó el quinto lugar.

Los tratamientos que produjeron el mejor crecimiento o sea el musgo esfagno y la vermiculita obtuvieron la supervivencia más baja (85%) mientras que el material que produjo el crecimiento más pobre, el aserrín puro tuvo la supervivencia más alta (95%), aunque los datos de supervivencia no se analizaron estadísticamente.

Año 1963

Debido a la dificultad de obtener musgo esfagno localmente y a que la vermiculita, que había ocupado el segundo lugar, es obtenible localmente a precios razonables durante este año se intensificó el uso de la vermiculita. Se estudió el efecto de una mezcla de partes iguales de vermiculita y de aserrín de caoba comparado con coco-peat. El musgo esfagno se usó como testigo por ser el material más conocido y de mejor efecto. El aserrín de madera aunque considerado como inferior a los demás se obtiene gratis.

El análisis estadístico de los datos de crecimiento en altura no demostró diferencias significativas entre los tres materiales o sea "coco-peat", la mezcla de aserrín y vermiculita y el musgo esfagno a pesar de que las observaciones oculares le daban superioridad en vigor y lozanía a los arbolitos en musgo esfagno, seguidos por los de la mezcla de aserrín y vermiculita ocupando los de "coco-peat" el tercer lugar. Los datos relativos al diámetro en la base de los arbolitos al cabo de 8 meses demostraron superioridad de los arbolitos en musgo esfagno comparados con los que crecieron en "coco-peat". El crecimiento en diámetro en la mezcla de aserrín y vermiculita fueron intermedios entre los de musgo esfagno y los de "coco-peat" pero estadísticamente no hubo diferencia entre ellos y los de estas otras dos materias.

La supervivencia de los arbolitos al cabo de seis meses fué como sigue: mezcla de vermiculita y aserrín - 100%, "coco-peat" - 97% y musgo esfagno - 95%.

La utilización de los distintos materiales en el enmacetado de los arbolitos de pino dependerá en gran medida del costo y de las facilidades para obtenerlos. Si se consigue musgo esfagno en suficiente cantidad y a un precio conveniente debe usarse preferentemente porque además de su efecto sobre el crecimiento de los arbolitos enmacetados éstos son muy livianos y muy prácticos para transportar y plantar. En la práctica el aserrín de caoba, sólo, produjo los peores resultados, pero los resultados fueron aceptables al mezclar el aserrín y la vermiculita. Esta última es muy satisfactoria sola o mezclada con suelo arenoso lómico o con aserrín. El "coco-peat" sigue después de la vermiculita por lo tanto si el "coco-peat" es más abundante y barato que el musgo o la vermiculita entonces puede usarse sólo o en mezcla con aserrín.

Preliminary trials of Honduras pine (Pinus caribaea Morelet var. hondurensis) in polyethylene plastic bags using different potting media have been reported3/. Height growth in sphagnum moss collected in the Luquillo mountains was about twice that in clay soil and 23 percent taller than in a mixture of sandy loam and vermiculite. Other media are being studied as possible substitutes for sphagnum moss, which is scarce and difficult to collect.

Results during 1962

The materials used were: (a) sphagnum moss, not ground up (used as collected), (b) pure ground vermiculite, (c) fresh coco-peat (ground dry coconut husks), (d) mahogany sawdust one-year-old, (e) a mixture of one part coco-peat and three parts mahogany sawdust, (f) a mixture of equal amounts of sawdust and coco-peat.

Standard polyethylene plastic bags, 4-1/2" wide x 9-1/2" long, with vents were filled. Each of four blocks contained 5 rows (plots) in which one bag was filled with each of the six different materials. Thus there were 5 replications of the six

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3/ Marrero, J. op. cit.

materials in a block. Pine seedlings about 2 inches tall (9 weeks old) were transplanted to each bag. Each seedling was inoculated by adding a pinch of soil containing mycorrhizal fungi at time of transplanting. The media were soaked with a solution of chemical fertilizer formula 20-20-20 previous to transplanting and thereafter once a month until time of planting. Height measurements were taken at this same interval, and diameter was measured during the last height measurement. Watering was done as necessary.

Seven months after planting the measurements were:

Table 1.--Average tree height ($\bar{h}$), after 7 months. Altura promedio al fin de 7 meses.

Block	Sphagnum Moss	Vermiculite	Coco-peat	Sawdust	1 Coco-peat 3 Sawdust	1 Coco-peat 1 Sawdust
	cm	cm	cm	cm	cm	cm
1	32.8	33.8	32.5	19.6	28.4	31.7
2	38.1	26.9	28.7	22.9	33.0	24.1
3	39.1	33.3	36.1	30.5	31.0	31.2
4	37.8	41.9	35.6	33.5	43.7	39.3
Average	36.8	34.3	33.3	26.2	32.3	31.2
Survival Percent	85	85	90	95	85	90

Table 2.--Mean stem diameter ($\bar{d}$), after 7 months. Diámetro promedio, al fin de 7 meses.

Block	Sphagnum Moss	Vermiculite	Coco-peat	Sawdust	1 Coco-peat 3 Sawdust	1 Coco-peat 1 Sawdust
	mm	mm	mm	mm	mm	mm
1	7.9	7.1	5.1	2.3	3.0	3.8
2	7.9	7.1	5.3	2.8	3.6	4.8
3	7.6	7.4	6.1	3.3	3.0	4.1
4	9.7	8.6	7.9	3.8	6.1	6.1
Average	8.3	7.6	6.1	3.0	3.9	4.7

Analysis of the data showed that the differences in height were not statistically significant. Diameter of the seedlings grown in sphagnum moss was significantly greater than in all other media except vermiculite. The latter was not significantly superior to sawdust nor the coco-peat-sawdust mixtures.

Results during 1963

Vermiculite mixed with an equal part of mahogany sawdust one year old, was used to grow the 1963 crop of pine seedlings for experimental plantings. Vermiculite is a readily obtainable standardized product, at a price that compares well with the others. Mahogany sawdust had not shown well in the 1962 study but is more readily obtainable than other materials. This mixture was compared with coco-peat, and sphagnum moss was used as a check, since it has consistently produced the best growth and thriftiness of the pine seedlings.

Seedlings about 2 inches tall were transplanted to 40 polyethylene bags with each one of the three media. These were then divided into 4 blocks of 10 seedlings per treatment. The bags were 6 inches deep, except for those with sphagnum which were 9 inches deep. The trees were treated with chemical fertilizer and heights were measured monthly.

The superior vigor of the trees growing in sphagnum moss was soon evident. They had a deep green color, were vigorous, and soon developed a thick stem. Those in the vermiculite-sawdust mixture were second in appearance and those in coco-peat were weakest and often yellowish.

Height at 6 months and diameter at 8 months are shown in Tables 3 and 4.

The differences in height were not statistically significant, in spite of the observed differences in vigor and thriftiness. Average diameter of the trees growing in sphagnum moss was significantly greater than of trees in coco-peat. The values for the vermiculite-sawdust mixture were not significantly different from either.

Discussion

Differences in the height growth of the Honduras pine stock grown in 7 different potting media were not statistically significant. The diameter of the stock grown in sphagnum moss was superior to that of all other media except pure vermiculite and the vermiculite-sawdust mixture. The latter medium was not statistically superior to coco-peat. Differences in survival, from 85 to 100 percent, were not significant.

Utilization of the different potting media will depend upon availability and cost of the material. Where sphagnum moss is available at a reasonable cost it appears to be the best medium for rapid growth and thrifty stock. In addition, it is very light to carry to the field. Mahogany sawdust proved acceptable if mixed with equal parts of ground vermiculite. Vermiculite is very satisfactory either pure or mixed with sawdust. The vigor of the stock grown in coco-peat is inferior to that of the stock grown in vermiculite or in the vermiculite mixture, although the differences were not statistically significant. Thus if vermiculite is available at a reasonable cost it is preferable to coco-peat.

Table 3.--Average tree height ($\bar{h}$), after 6 months.
Altura promedio al fin de 6 meses.

Block	1/2 vermiculite 1/2 sawdust	Coco-peat	Sphagnum moss
	cm	cm	cm
1	32.0	26.7	26.7
2	25.7	23.9	27.4
3	32.3	29.7	30.0
4	18.3	19.6	27.4
Average	26.9	24.9	27.9
Survival Percent	100	97	95

Table 4.--Average stem diameter ($\bar{d}$) at soil level, after 8 months.
Diámetro promedio del tallo al nivel del suelo, al fin de 8 meses.

Block	1/2 vermiculite 1/2 sawdust	Coco-peat	Sphagnum moss
	mm	mm	mm
1	9.4	7.6	9.9
2	6.1	5.3	7.4
3	7.9	7.6	11.7
4	5.3	4.6	8.4
Average	7.4	6.3	9.1